



DEPARTMENT OF THE NAVY
OFFICE OF THE CHIEF OF NAVAL OPERATIONS
WASHINGTON, DC 20350-2000

IN REPLY REFER TO

OPNAVINST 4100.5D
N442G
12 April 1994

OPNAV INSTRUCTION 4100.5D

From: Chief of Naval Operations

Subj: ENERGY MANAGEMENT

Ref: (a) Executive Order No. 12902 (NOTAL)
(b) Defense Energy Program Policy Memorandum (DEPPM) 91-1
of 17 Oct 1990 (NOTAL)
(c) Defense Energy Program Policy Memorandum (DEPPM) 91-2
of 19 Mar 1991 (NOTAL)
(d) Defense Energy Program Policy Memorandum (DEPPM) 92-2
of 4 Mar 1992 (NOTAL)
(e) 10 CFR, Part 435 (NOTAL)
(f) Public Law 102-486 (NOTAL)

Encl: (1) Reserved for Aircraft Energy Conservation Guidance
(2) Reserved for Surface Vessel Guidance
(3) Shore Facilities Energy Functions and Responsibilities
(4) Energy Management Guidelines for Shore Activities

1. Purpose. To issue policy, objectives, goals, and assign responsibilities for energy management for non-nuclear ships, aircraft, vehicles, and shore installations. This instruction is a major revision and should be read in its entirety.

2. Cancellation. OPNAVINST 4100.5C.

3. Background. Faced with an energy budget that exceeds two billion dollars and decreases in operating funds, we must use all available means to reduce our energy costs and increase efficiency. Ship and aircraft operations account for two-thirds of the Navy's total energy cost, energy represents one-third of the operating cost of naval shore facilities. Effective energy management, combined with alternative energy sources and innovative contracting techniques, can achieve significant payoffs in enhanced operational capabilities and in energy cost avoidance.

4. Policy. All practical efforts shall be made to improve the management of Navy energy consumption following the objectives and goals of enclosures (1) through (3) of this instruction.



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Military readiness, sustainability, quality of life, and safety are not to be compromised. Actions shall be taken to achieve real (measurable) rather than statistical efficiencies. The goals prescribed below are achievable, minimum levels which should be exceeded where feasible and cost-effective.

5. Objectives

a. Improve fleet readiness and sustainability and reduce costs through the application of more energy efficient facilities and systems throughout the shore support establishment and operating forces.

b. Substitute, where practical and cost effective, more abundant or renewable energy sources for petroleum.

c. Participate in demand side management and conservation programs that are offered by utility companies which includes the acceptance, retention, and use, without further appropriation, of any technical service, equipment (installed or not installed), or financial incentive available from a gas or electric utility.

d. Obtain reliable natural gas supplies at the lowest cost through centralized acquisitions.

e. Streamline procedures to stimulate participation in Energy Savings Performance contracts (ESPC).

f. Ensure that activities provide energy efficient replacement components to ensure the integrity of energy-conscious maintenance.

g. Ensure personnel who design, install, operate, and maintain energy systems are trained to do so in the most efficient manner.

h. Include energy-efficient improvements in repair projects.

i. Ensure energy efficiency and fuel flexibility are taken into account in the design and acquisition of new facilities and equipment. Ensure that in approving modifications or repairs on existing systems that the potential impact on energy consumption is balanced against other requirements including: mission, vulnerability, environmental impacts, quality of life, and life-cycle cost.

j. Ensure that adequate supplies of fuel meeting required standards are provided to the fleet to sustain operation.

k. Establish an Energy Cost Avoidance Program using revenue obtained from sale of energy from geothermal energy, alternative energy, or cogeneration power plants which are located on Navy facilities, or land controlled by the Navy. This program will be

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used to assist all claimants and activities to meet the shore facilities objectives and goals of this instruction.

1. Identify and execute by 2005, all shore facilities energy and water conservation projects with a payback period of less than 10 years.

m. Identify and train facility energy managers at all shore installations.

6. Goals. The following goals apply Navy-wide. They shall be carefully examined by all echelons and used for daily operation and management. These goals are consistent with Federal and Department of Defense energy goals as described in references (a) through (f). Conservation goals are measured from the Fiscal Year (FY) 1985 baseline (1 October 1984 to 30 September 1985) unless otherwise indicated. In computing the British Thermal Unit (BTU) equivalents, the conversion factor for purchased electricity shall be 3,413 BTU per kilowatt-hour.

a. Aircraft operations. Reduce fuel consumption per flying hour five percent by the end of FY 1995 as compared to FY 1985, and 10 percent by end FY 2000.

b. Ship operations. Reduce non-nuclear ship fuel consumption 15 percent per underway steaming hour by the end of FY 1995 as compared to FY 1985, and 20 percent by the end of FY 2000.

c. Facilities

(1) Existing Buildings. Reduce energy consumption per thousand gross square feet by 30 percent by the end of FY 2005.

(2) New Buildings. Reduce the estimated annual design energy usage per gross square foot by one percent per year achieving a 10 percent reduction for those buildings designed in FY 1995 compared with comparable buildings designed in FY 1985. Ensure the design and construction of buildings for Federal use comply with the energy performance standards applicable to Federal residential and commercial buildings set forth in reference (e).

(3) All shore activities shall support the following overall Navy goals to the maximum extent cost-effective and practical:

(a) By 1995, obtain 10 percent of total Navy shore facility energy from coal, solid fuels, and renewable energy sources.

(b) Comply with the requirements of the Energy Policy Act of 1992 as it pertains to vehicles and facilities.

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(4) Industrial Activities. Improve gross energy efficiency 20 percent by FY 2005 as compared to FY 1990.

7. Organization. The following organizational structure will be established and supported within the Navy.

a. The Navy Energy Policy Council which is responsible for policy; membership shall consist of the following:

Chair: Assistant Deputy Chief of Naval Operations (Logistics)
Director, Deputy Chief of Naval Operations (Logistics),
Shore Installations Management Division
Director, Deputy Chief of Naval Operations (Logistics),
Shore Activities Division
Vice Commander, Naval Facilities Engineering Command
Vice Commander, Naval Sea Systems Command
Vice Commander, Naval Air Systems Command
Vice Commander, Naval Supply Systems Command
Other Chief of Naval Operations codes as necessary.

b. The Navy Energy Action Officer is responsible for non-nuclear energy issues and is located under the Deputy Chief of Naval Operations (Logistics) in the Shore Activities Division (Flag/Family Housing/Energy Officer, N442G).

c. Energy Offices for facilities shall be established by all major claimants and, within 4 months after the effective date of this instruction, staffed as necessary. In addition, within 4 months after the effective date of this instruction, the Naval Air Systems Command (COMNAVAIRSYSCOM) shall establish an energy office for aircraft, Naval Sea Systems Command (COMNAVSEASYS COM) shall establish an energy office for surface vessels, and Commander in Chief, Atlantic Fleet (CINCLANTFLT), and Commander in Chief, Pacific Fleet (CINCPACFLT), shall establish energy offices for fleet operations. Each energy office shall, as a minimum, consist of a collateral duty point of contact responsible for coordination with the Navy Energy Action Officer, (N442G).

d. Naval Facilities Engineering Command: Establish a Navy Shore Facilities Energy Office to support the Navy shore facilities energy management program.

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e. The Navy Energy Action Group is responsible to coordinate policy execution across organization lines and to serve as staff to the Navy Energy Policy Council. Its membership shall consist of the following:

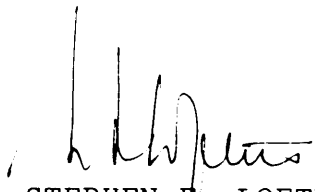
Chair: Navy Energy Action Officer (N442G)

Office of the Chief of Naval Operations (N461)
Office of the Chief of Naval Operations (N413)
COMNAVAIRSYSCOM Energy Office for aircraft
Naval Facilities Engineering Command Shore Facilities
Energy Office
COMNAVSEASYSYSCOM Energy Office for surface vessels
Navy Petroleum Office
CINCLANTFLT Energy Office for operations
CINCLANTFLT Energy Office for facilities
CINCPACFLT Energy Office for operations
CINCPACFLT Energy Office for facilities
Office of Naval Research (ONR),
Energy Research Program Manager
Other members as requested.

The initial task of the Action Group is to validate, and revise if necessary, the energy goals specified in this instruction for surface vessels and aircraft and, within 18 months of the effective date of this instruction, develop implementation guidance. Enclosures (1) and (2) in this instruction are reserved for this aircraft and surface vessel guidance respectively. The Navy Energy Action Group shall also provide direction to ONR for the energy research and development program.

8. Action. Action addresses shall meet the goals and objectives of paragraphs 5, 6, and 7, and carry out the functions and responsibilities in enclosures (1), (2), and (3).

9. Report. The Defense Utility Energy Reporting System (DUERS) and annual Major Claimant and Shore Activity Energy Management Reports described in enclosure (3) are assigned symbol DD-A&T(M)1313(4100), and are approved for 3 years from the date of this directive.



STEPHEN F. LOFTUS
Deputy Chief of Naval
Operations (Logistics)

OPNAVINST 4100.5D

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SHORE FACILITIES ENERGY FUNCTIONS AND RESPONSIBILITIES

1. Office of the Chief of Naval Operations (CNO)

a. The Deputy Chief of Naval Operations (DCNO) (Logistics) (N4) shall:

(1) with the Navy Energy Policy Council, establish policy, coordinate, and monitor the non-nuclear energy program.

(2) be the resource and appropriation sponsor for energy Research and Development (R&D) funds and for the Energy Conservation Investment Program (ECIP) within the Navy Planning, Programming, and Budgeting System (PPBS).

(3) coordinate with the Department of Defense (DOD), other military services, other government agencies, and the private sector concerning energy matters.

(4) select and prioritize ECIP projects for submission to the Office of the Secretary of Defense (OSD) and Congress.

(5) manage and direct the energy awareness funds identified in reference (c).

(6) prepare and submit by 15 April each year an annual progress report to OSD on progress toward achieving the goals.

(7) support the organization structure described in this instruction.

b. Other OPNAV Principal Officials shall:

(1) as resource sponsors, make appropriate provisions in their plans, programs, and budgets for improving energy efficiency and avoiding unnecessary energy consumption and costs.

(2) ensure that energy requirements are considered in system planning, selection, design, and acquisition. Major considerations should be to optimize energy usage and substitution of other energy sources for petroleum.

2. Office of Naval Research (ONR)

a. Establish and manage an energy R&D program to develop new methods, technology, and systems which will improve the energy efficiency of naval facilities and utilities, and allow the use of non-petroleum based energy sources. Ensure these systems transition effectively to operational applications through coordination with the System Commands (SYSCOMs).

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b. Provide necessary resources to support tri-service efforts in energy.

3. Major Claimants

a. Provide the necessary criteria, operations and maintenance (O&M) standards, management guidance and engineering expertise to identify and implement conservation actions to assist CNO and commands in meeting the objectives and goals of this instruction.

b. Evaluate energy retrofit projects based upon savings to investment ratios.

c. Monitor subordinate command energy management performance and take actions necessary for these commands to achieve the objectives and goals of this instruction.

d. By March 1 of each year, submit to the Chief of Naval Operations (N4) under report symbol DD-A&T(M)1313(4100) a detailed report describing what actions were taken in the preceding fiscal year to attain the stated goals of this instruction.

e. Ensure energy efficient improvements are incorporated into repair projects.

f. Support as necessary all councils identified in this instruction.

4. Systems Commands. In addition to the tasking in paragraph 3:

a. Assist ONR in identifying the new methods, technology, and systems required to meet the goals of this instruction. Ensure timely and effective transition of the products of the energy R&D program to operational use.

b. Ensure that energy efficiency and fuel flexibility are taken into account in the design and acquisition of new systems, equipment, and facilities, and when modifying existing systems, equipment, and facilities.

5. Naval Facilities Engineering Command (COMNAVFACENGCOM). In addition to the responsibilities in paragraphs 3 and 4:

a. Identify and staff the Shore Facilities Energy Office as required by this instruction. This Office is responsible for implementing the actions of this instruction as they pertain to the shore establishment including:

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(1) Develop an annual energy program execution plan for shore facilities and vehicles, including the allocation of all energy program funds, by each October for approval by the CNO (N4). Upon approval, manage and coordinate the plan's execution.

(2) Establish and chair a Navy Shore Energy Coordinating Council. The council membership shall consist of the Head of the Navy Shore Facilities Energy Office and the claimant staff civil engineers. The Council shall meet; as a minimum once, per year to update the energy program execution plan, review energy conservation progress, develop energy project priority criteria, develop facilities energy management guidance, and provide input to the Energy Action Group.

(3) Through the Energy Action Group and the Navy Shore Energy Coordinating Council, develop and issue guidance, and revise the energy execution plan for facilities and vehicles to implement shore facility or vehicle energy policy or requirements.

(4) Establish procedures to facilitate maximum use of Public Utility company demand side management (DSM) and other programs generally available to all utility customers, under existing and planned utility procurement contracts. Provide input on Navy plans and actions to use utility DSM programs to the Department of the Army as part of the DOD integrated strategy on Public Utility programs.

(5) Administer for the Navy the Defense Utility Energy Reporting System (DUERS), formerly the Defense Energy Information System, Part II (DEIS II). Prepare, evaluate, and distribute the quarterly Energy Audit Report (EAR) for facilities energy data and goal progress.

(6) Develop and administer an Energy Project Status System (EPSS) for CNO (N4) submission to OSD.

(7) Manage DOD-provided funding for a Navy-wide energy awareness program.

(8) Develop energy-efficient facilities maintenance policy and guidelines.

(9) Develop and coordinate DOD Geothermal and Solar applications as required by reference (c).

(10) Issue a standard format for the Energy Management Report and consolidate all claimant reports identified in this instruction.

(11) Develop and manage an integrated energy system training program.

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(12) Develop and provide annual updates of shore facility energy Research, Development, Test, & Evaluation requirements to the Energy Action Group and ONR.

b. Provide assistance and support with such services as: criteria, operations and maintenance standards, management guidance, training, and engineering expertise necessary to identify conservation action to meet the objectives and goals of this instruction.

c. Establish a central Energy Services Program consisting of technical, contractual, and legal resources to provide the expertise and continuity needed to execute public/private venture energy services contracts including energy saving performance (ESP), DSM, and renewable energy contracts as required by reference (c).

d. Determine the availability of competitive natural gas and pipeline transportation and investigate opportunities for reducing costs through provision of source supply gas. Provide for centralized interfacing between shore activities and other government agencies and departments on matters relating to management of natural gas supply. Provide services related to management of technical and business activities necessary to secure cost reductions and reliable supplies of natural gas.

e. Act as the Major Claimant for ECIP projects within the Navy Planning, Programming, and Budgeting System (PPBS).

f. Provide policy and tools to assist activities in preparing energy management plans.

g. Establish and manage the Energy Cost Avoidance Program (ECAP). ECAP shall be funded by the net revenue obtained from the sale of energy from all geothermal, alternative energy, or cogeneration power plants which are located on facilities or land owned or controlled by the Navy. ECAP shall fund energy project development, public private venture energy contract development (government or contractor engineering, environmental, and contracting efforts), geothermal and alternative energy resource development, geothermal and alternative energy contract and resource management, energy program training, and energy projects which assist activities and claimants reduce energy costs and achieve the energy goals and management standards of this instruction.

h. Establish accounting procedures to allow Navy Public Works Centers to execute the requirements of Paragraphs 7(a) and 7(b) of this enclosure.

i. Family Housing: In addition to the responsibilities assigned to COMNAVFACENGCOM as major claimant for housing:

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(1) Provide activities with personal computer based software for analysis of Energy Retrofit Opportunities and the maintenance of the Family Housing Energy characteristics database.

(2) Provide information and training to housing managers to increase awareness of energy efficient appliances and other energy consuming devices.

6. Navy Shore Activities

a. Ensure consumption is reported in DUERS Reports (formerly DEIS II), or included in reports submitted by the host command, Public Works Center, or Engineering Field Division. Report symbol DD-A&T(M)1313(4100) is assigned to this reporting requirement.

b. If applicable, review and update the quarterly Energy Audit Report (EAR) to assess energy management performance. Take actions necessary to achieve the objectives and goals of this instruction.

c. As practical, follow the energy management guidelines for shore activities, enclosure (4) of this instruction.

d. When implemented, review and update the Energy Project Status System (EPSS). The EPSS will provide information on all energy initiatives and projects. All energy and water projects with payback periods of 10 years or less shall be identified and submitted per the requirements of the applicable program (e.g: ECAP and ECIP).

e. Develop and maintain a local instruction to implement the energy reduction goals and objectives of this instruction, or comply with the host command instruction.

f. By 1 February each year, provide the major claimant with a detailed report, under report symbol DD-A&T(M)1313(4100), describing any actions were taken in the preceding fiscal year to meet or exceed the stated goals and objectives of this instruction.

g. Utilize energy efficient maintenance and replacement components and practices in daily operations.

h. Train energy system operators by 1 January 1998 to ensure energy consuming equipment is operated at optimum efficiency.

i. If applicable and available, participate in the source supply natural gas program when cost effective, and reliable supplies can be secured meeting mission requirements. If applicable and available, participate in utility demand side management program.

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j. If applicable, provide annual updates to the family housing energy characteristics data base by 31 March each year.

7. Navy Public Works Centers and other Defense Business Operating Fund activities (if applicable). In addition to the requirements of paragraph 6:

a. Billing for facility energy related utility services should be based upon metered energy consumption, or by estimates regularly verified by metering or other measurements of actual consumption. Funding for meter installation, maintenance, and reading shall be incorporated within the rate structure for the utility service provided.

b. Provide energy management as one of the products and services provided to tenant activities. Establish a service to fund and install energy saving equipment and energy retrofits on customer or tenant facilities, with the cost of the service recovered as a share of the ensuing savings realized by the benefiting customer or tenant command.

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ENERGY MANAGEMENT GUIDELINES FOR SHORE ACTIVITIES

1. Facilities Operation. Operating hours of facility energy systems shall be minimized to the greatest extent possible without adversely affecting mission requirements, building materials and systems, and quality of life of personnel using or living in the facility.

2. Comfort, Heating, and Cooling

a. Bachelor Quarters, Administrative Spaces, and Family Housing:

(1) Cooling: Spaces authorized comfort cooling shall be maintained at temperatures no lower than 76°F (24.4°C). During unoccupied hours, cooling systems shall be secured where appropriate.

(2) Heating: Spaces requiring comfort heating shall be maintained at temperatures no higher than 70°F (21.1°C). During unoccupied hours, temperatures shall be set no higher than 55°F (12.8°C).

b. Laboratories, shops, warehouses, etc: Temperatures shall be maintained to minimize energy consumption, with 55°F (12.8°C) being maximum for heating purposes in storage spaces.

3. Domestic Hot Water Temperatures

a. For other than family housing and special purposes (laundries, galleys, etc), temperatures should not exceed 105°F (40.6°C) at point of use. Domestic hot water circulating pumps and heating elements shall be turned off during unoccupied hours.

b. For family housing without dishwashers, hot water temperatures shall not exceed 120°F (48.9°C).

c. For family housing with dishwashers, hot water temperatures shall not exceed 140°F (60.0°C).

d. For special purposes (laundries, galleys, etc.), hot water temperatures shall be maintained to meet applicable operational requirements while minimizing energy consumption.

4. Interior Lighting

a. Administrative Areas: During occupied hours, overhead lighting shall be 50 footcandles at work stations, 30 footcandles in work areas, and 10 footcandles in passageways. During unoccupied hours, all possible lighting will be secured. The use of incandescent lighting shall be minimized. High efficiency florescent and other high efficiency lighting systems shall be used to the maximum extent possible.

Enclosure (4)

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b. All other areas: Lighting levels shall be set to minimize energy consumption.

5. Exterior Lighting. The maximum practical use shall be made of high efficiency equipment such as high pressure sodium lighting. Exterior lighting shall be turned off when not required, making use of automatic controls such as photocells and time clocks.

6. Heating and Power Plants. All heating and power plants shall be operated at optimum efficiency at all loads. The combustion efficiency of all boilers that are continuously manned shall be checked every 8 hours to ensure that efficiency is within 5 percent of optimum efficiency. The combustion efficiency of all other boilers with 350,000 BTU per hour input capacity or greater shall be checked at least monthly.

7. Steam Systems. Exterior steam distribution systems and steam systems in buildings shall be maintained to minimize losses. Steam traps shall be inspected annually and repaired as necessary. All steam leaks shall be repaired and bare steam piping including valves shall be insulated.

8. Heating, Ventilating, and Air Conditioning Systems (HVAC). HVAC equipment shall be operated and maintained to minimize energy usage with particular attention paid to calibration and adjustment of controls, reduction of damper air leakage, and efficient operation of chilled water systems.

9. Weatherization. All buildings shall be weatherized as appropriate for facility type, use, and location.